

Final determination of causer: 11 July 2025 under-frequency event

Decision paper

5/05/2026



Executive summary

The purpose of this paper is to set out the Electricity Authority Te Mana Hiko's (Authority) final determination of causer for the under-frequency event (UFE) that occurred on 11 July 2025.

The normal frequency band in the New Zealand power system is between 49.8Hz and 50.2Hz. A UFE occurs when the frequency falls below 49.25Hz because of a change in the injection or demand for electricity of more than 60 megawatts (MW) of power injected into the grid.

The Electricity Industry Participation Code 2010 (Code) requires the Authority to determine the causer of a UFE and sets out the process for making the determination.

The process for determining the causer of a UFE is set out in clauses 8.60 and 8.61 of the Code.

The System Operator must investigate the event and provide a report to the Authority including its assessment of whether the event was caused by a participant. The Authority must then determine the causer. Where the participant identified in the System Operator's report denies it is the causer, the Authority must publish a draft determination and consult with every participant substantially affected before making a final determination.

The System Operator provided its report to the Authority on 1 October 2025 and identified the grid owner as the causer of the 11 July 2025 UFE. The grid owner disputed it was the causer, and accordingly the Authority published its draft determination seeking feedback on 23 December 2025.

The Authority's final determination is that the System Operator was the causer of the 11 July 2025 UFE

The Authority's final determination is that Transpower New Zealand Limited, as the System Operator, was the causer of the 11 July 2025 UFE. The reasons for this final determination are:

- (a) During a planned outage of 220 kV Bus D at Haywards substation (HAY), the HVDC northward transfer power ramped down from 178MW to 68MW at about 1.04pm on 11 July 2025. This sudden ramp down caused the North Island grid frequency to drop to 49.24Hz, resulting in the UFE.
- (b) The ramp down occurred because incorrect control settings were applied during the Bus D outage, which imposed a power limit on the HVDC link.
- (c) The Harmonic Performance Controller (HPC) manages how the HVDC link behaves when harmonic filters are switched in or out. Before certain outages, specific HPC control settings must be applied to prevent the HVDC from imposing unintended power limits. However incorrect control settings were in place because the following key HPC settings were not applied:
 - (i) HPC Roundpower should have been set to "Monopole" at HAY
 - (ii) HPC Switch Level should have been set to "Increased" at HAY.
- (d) As part of the process of removing transmission assets (including HVDC equipment) from service, the System Operator's National Coordination Centre (NCC) coordinators issue permissions, and potentially instructions, to the grid asset controllers (GAC) at the grid owner's National Grid Operations Centre (NGOC).
- (e) The System Operator's own standing temporary written instructions (TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages) specify that the System

Operator security coordinator¹ issues instructions to apply the correct control settings in respect of HPC Roundpower and HPC Switch Level.

- (f) The System Operator security coordinator deviated from its own written procedures and decided not to instruct the grid owner to apply the correct control settings listed above.
- (g) About an hour before the scheduled outage, the System Operator's security coordinator informed the GAC by telephone, that it would not issue instructions to apply the correct control settings as it considered them unnecessary.
- (h) The security coordinator issued permission to proceed with the existing control settings in place.
- (i) The omission of the security coordinator to issue the instructions to apply the correct control settings resulted in a power limit being applied to the HVDC transfer, which ultimately caused the UFE.
- (j) Although the GAC could have sought clarification after the phone call with the security coordinator, the Authority considers the cause of the event to be the security coordinator's omission to issue instructions to apply the HPC settings. Without that omission, the HPC settings would have been applied and the UFE would not have occurred.

Although the UFE was resolved without widespread impact, the event raised questions about the independence of the System Operator and the grid owner in operational decision making.

The deviation from established procedures - specifically, the System Operator's responsibility for issuing instructions for the correct control settings to be applied to the grid owner's asset, and the grid owner's acceptance of those instructions without challenge - highlights potential risks where operational roles and responsibilities may become blurred.

The Authority considers that clarity and independence in decision making are critical to maintaining confidence in the integrity of system operations. The Authority notes this as an observation arising from the facts of this event. It does not form part of the causer determination.

¹ Under TI-DP-1139, the HPC setting instructions are assigned to the energy coordinator while the Bus D switching is assigned to the security coordinator. On 11 July 2025, it was the security coordinator – not the energy coordinator – who communicated to the grid asset controller that the HPC setting instructions would not be issued.

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1 Purpose

- 1.1 This paper sets out the Electricity Authority Te Mana Hiko's (Authority's) final determination that the System Operator is the causer of the 11 July 2025 UFE.

2 An under-frequency event occurred on 11 July 2025

Transpower's roles

- 2.1 Transpower performs two distinct roles. It is the grid owner (responsible for owning, maintaining and operating transmission assets, through its National Grid Operations Centre - NGOC) and it is also the System Operator (responsible for real-time coordination of the power system, through its National Coordination Centre - NCC). Both roles sit within Transpower.
- 2.2 The System Operator operates through its National Coordination Centre (NCC). Key roles include the Security Coordinator, who has overall authority to manage the real-time security of the grid system, and the Energy Coordinator, who issues operational instructions to GACs.
- 2.3 The grid owner operates through its National Grid Operations Centre (NGOC), where GACs carry out switching, configuration changes, and other operational actions on grid assets under instruction from NCC. NCC and NGOC operate within a framework described by the grid owner in which decisions are made by NCC and carried out by NGOC.

Events leading to the under-frequency event

- 2.4 On 11 July 2025, part of the Haywards (HAY) substation 220 kV Bus D was to be released from service for planned maintenance. For situations involving the outage of Bus D, there was a standing written temporary instruction set out in the System Operator document "*TP-DP-1139 Hay Bus D Removal for HAY Bus Zone and CB Fail Outages*".
- 2.5 Before the outage, staff at the System Operator – NCC, decided to deviate from the standing written temporary instruction by not instructing the grid owner to apply two specific HVDC control settings. These settings are associated with the Harmonic Performance Controller, which normally manages DC power and current levels when harmonic filters are switched in or out by the Reactive Power Controller.
- 2.6 The Security Coordinator informed the grid owner of its decision about an hour before the planned outage. The decision was a deviation from the System Operator's standing temporary written instruction which specifies that the System Operator issues instructions to apply specific Harmonic Performance Control (HPC) settings.
- 2.7 The equipment associated with the release of Bus D was taken offline at about 8.00am on 11 July 2025, and at about 1.04pm there was a sudden drop in HVDC power transfer into the North Island, from 178MW to 68MW. This reduced power transfer caused the North Island system frequency to drop to 49.24Hz. The failure to apply the correct HPC settings was the root cause of the UFE.

3 The System Operator investigated the causer of the UFE

- 3.1 The System Operator's causation report, dated 1 October 2025 is attached as **Appendix A**. The System Operator acknowledged that it communicated with the grid owner prior to the planned outage about not instructing the grid owner to apply the correct HPC settings. However, the System Operator's view was that the grid owner was the causer because, in summary, it:

- (a) is better placed than the System Operator to know how to operate the HVDC
- (b) should be well informed about the operational limits of its equipment
- (c) had an opportunity to disagree with the System Operator about not applying the two specific HVDC control settings, but did not do so.

4 The grid owner disputed that it was the causer of the UFE

4.1 The grid owner did not accept that it was the causer of the 11 July 2025 UFE. The grid owner's position is set out in more detail in the [draft determination](#), however in summary its view is that:

- (a) Transpower policies and procedures require NGOC operators to act only under NCC instructions
- (b) acting under instruction is consistent with the grid owner and the System Operator's respective roles and responsibilities
- (c) the grid owner has no authority to deviate or override instructions from the System Operator – while it may raise concerns or seek clarifications, it cannot substitute its judgment for that of the System Operator
- (d) the System Operator's decision not to issue an instruction to apply the correct HPC settings led directly to the HVDC power limit and subsequent UFE, and accordingly the System Operator meets the Code definition of causer.
- (e) NGOC operators are not required to be engineering experts with experience across the breadth of electrical systems on the grid. Their role is to implement instructions, not to assess or challenge operational decisions.

5 We consulted on the draft determination and considered the submissions received

5.1 We consulted on our draft determination (**Appendix B**) that the System Operator was the causer of the UFE. The consultation period was from 23 December 2025 to 23 January 2026. At the request of the System Operator, we extended the deadline for all consultation responses to 30 January 2026.

The System Operator responded to the consultation

- 5.2 The System Operator was the only participant to submit on the Authority's draft determination. The System Operator's submission is included as **Appendix C** to this final determination.
- 5.3 The grid owner did not submit on the draft determination.
- 5.4 The System Operator submitted that the grid owner should be found to be the causer of the event. The key reasons advanced in support of this position include that:
- (a) as the owner and operator of the HVDC link, the grid owner:
 - (i) is better placed than the System Operator to know how to operate the HVDC link, including its appropriate control settings
 - (ii) has access to experts within an Operational Engineering team to provide advice to the grid owner's operational staff
 - (iii) is fully informed about the operational limits of the HVDC link

- (b) the grid owner was involved in the decision not to apply the HPC settings, and chose not to challenge the System Operator's recommendation
 - (c) the grid owner, not the System Operator, is obliged to operate the HVDC link in accordance with good electricity industry practice (clause 12.113 of the Code).
- 5.5 The System Operator stated that there were non-standard restrictions in place on HVDC harmonic filter switching (referred to in the System Operator's investigation as TI-DP-1195), and that this was the reason it considered the prescribed HPC settings to be unnecessary. The System Operator's view was that because the filters would not need to be switched during the outage, the HPC settings – which manage HVDC behaviour when filters change state – were redundant.
- 5.6 Additionally, the System Operator's view is that deviations from procedures are sometimes necessary when operational conditions require or justify it. This is important given the complexity of the power system and is aligned with the practicalities of System Operator decision making.
- 5.7 The Authority notes that TI-DP-1139 assigns the HPC setting instructions to the Energy Coordinator and the Bus D switching to the Security Coordinator. The Authority believes that role separation is an important procedural control – the switching action should not proceed until the pre-conditions have been met. On 11 July 2025, it appears to the Authority that the Security Coordinator decided that the Energy Coordinator's step was unnecessary and communicated this decision to the GAC at the NGOC. The effect was to bypass the role separation built into the procedure. The Authority does not accept that this type of deviation – where one role unilaterally overrides a step assigned to another – can be characterised as a routine operational judgment, nor was this an emergency event where flexibility and a departure from procedures could be justified.
- 5.8 The Authority notes that the roles and responsibilities of the Energy Coordinator and Security Coordinator are defined in the System Operator's internal procedures, which are not routinely available to the Authority. The Authority's understanding of these roles in relation to this event is derived from TI-DP-1139 and the information provided during the investigation.
- 5.9 The definition of causer was replaced on 1 May 2025, which widened the scope of potential causers to include all participants, which includes the System Operator. The previous definition of causer was limited to generators and grid owners. The System Operator outlined in its submission several policy-related reasons why it should not be a causer of any UFE, at least not by reason of an omission:
- (a) if the System Operator can be a causer, then this is likely to have a chilling effect on potentially valuable discussions about asset operational matters between the System Operator and asset owners. It believes such discussions are much more likely to avert potential UFEs and other undesirable power system conditions than lead to them.
 - (b) if the System Operator can be a causer, particularly by reason of an omission, asset owners may use that to obfuscate what would otherwise be straightforward causer determinations.
 - (c) in its view, the extension of the causer definition to the System Operator is beyond the original problem description supporting the change to the definition in May 2025. The Authority's October 2024 consultation paper said the change was being proposed to "Include distributors and energy storage systems as potential causers of under frequency events". There was at that stage no mention of it being a problem that the System Operator could not be a causer, or an intention to capture the System Operator in the amended definition.

- 5.10 The System Operator accepts that the current Code definition of causer is, on its face, sufficiently wide to capture the System Operator. However, it suggests that for the reasons outlined above in paragraph 5.9, the bar should be set very high when determining whether the System Operator is the causer of a UFE. In this case, the System Operator considers the facts do not support a determination that the System Operator is the causer.

6 Our final determination is that the System Operator is the causer of the UFE

- 6.1 The Authority has considered the System Operator's causer report, its submission on the draft determination, and correspondence with the grid owner and our final determination is that the System Operator was the causer of the UFE.
- 6.2 While the UFE was resolved without widespread impact, the Authority considers that the circumstances exposed the risk of a much more significant event. Had the HVDC been operating at higher transfer levels, the same procedural failure could have caused a substantially larger loss of supply and a more severe frequency excursion. This underlines the importance of adherence to procedures and robust decision-making processes where there is a deviation from those procedures.

Response to System Operator's causer report and submission

- 6.3 The Authority disagrees with the findings in the causer report and the System Operator's submission that the grid owner was the causer of the UFE.
- 6.4 The Authority accepts the grid owner's position that it cannot override an instruction from the System Operator. This behaviour and relationship is underpinned by the System Operator and grid owner's respective roles and responsibilities, various operating procedures, and the Code.
- 6.5 The System Operator referred to the grid owner's obligation under clause 12.113 to operate the HVDC in accordance with Good Electricity Industry Practice (GEIP). Whether the grid owner met this obligation is a question of compliance that may be considered independently. The assessment of compliance involves different analyses and tests from those applicable to the Authority's determination of causer, which is concerned with whether a UFE was caused by an interruption to, or reduction of, electricity supply from a participant's asset, and if so, whether another participant's act, omission or property caused that interruption or reduction.
- 6.6 The System Operator submits that the Authority's finding effectively attributes the grid owner's HVDC expertise to the System Operator, contrary to clause 7.10(2) of the Code². The Authority does not agree with this characterisation. Our understanding is that the grid owner's HVDC Bipole Operating Policy (TP.OG 48.02) is provided to the System Operator so that it can operate the HVDC safely – this is information received by the System Operator in its capacity as System Operator, not imputed grid owner knowledge. Our understanding is that PR-DC-663 translates these operating requirements into specific procedural steps. Both of these policies inform TI-DP-1139. The Authority's finding is based on the System Operator's failure to follow the steps in the TI-DP-1139 procedure. No specialist HVDC knowledge was required to follow the procedure. Indeed, the fact that the System Operator's coordinators are not HVDC specialists is precisely why the written procedure existed – to

² Clause 7.10(1)(2) of the Code provides that Transpower's role as System Operator under the Code and the Electricity Industry Act 2010 is distinct and separate from any other role or capacity that Transpower may have under this Code and the Act, including as a grid owner or transmission provider. For this purpose, when assessing an aspect of the performance, or non-performance of the system operator, the assessment must be made on the basis that the System Operator had no other role or capacity, and the System Operator must be treated as if it did not have any knowledge or information that may be received or held by Transpower unless Transpower receives or holds that information or knowledge in its capacity as System Operator.

ensure the correct steps were followed without requiring specialist knowledge. Clause 7.10(2) requires that the System Operator be assessed on the basis of its own roles and knowledge, which includes its own procedures, the operational information provided to it, and its own decision to deviate from them.

- 6.7 The Authority considers the System Operator should have followed its own procedure (as set out in TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages) for removing HAY Bus D, by instructing the grid owner to apply the prescribed HPC setting changes at the pre-determined point in the procedure.
- 6.8 When the cause of the UFE was identified, the grid owner requested an instruction from the System Operator to select HPC 'Roundpower' to 'Monopole' and 'Switch Level' to 'Increased'. This adds weight to the grid owner's position that it can only act under instruction from the System Operator – if not, then the grid owner could have made the change without requesting an instruction.
- 6.9 The Authority considers the nature of the voice call at 6.57am was not that of a "discussion" as the System Operator described it in its causer report. More correctly, it was a communication from a NCC security coordinator to a GAC of a decision that had been considered by a group at the System Operator (to not issue instructions to apply the correct HPC control settings). The GAC simply acknowledged the security coordinator's reasons for making the change to the procedure without question, discussion, or consideration of referral to an HVDC engineer.
- 6.10 The GAC had an opportunity to question or seek further explanation for the deviation from the procedure, but did not do so. The grid owner's view is that its GACs are not required to be HVDC engineering experts. In this context, it was reasonable for the GAC to accept the Security Coordinator's decision that NCC's Energy Coordinator would not issue an instruction to apply the prescribed HPC setting changes at 8.00am, as previously planned.

Policy decisions are outside the scope of this determination

- 6.11 We acknowledge the System Operator's submission regarding its inclusion within the definition of "causer" following the amendment to the Code in May 2025.
- 6.12 The Authority is required to apply the Code as it stood at the time of the event. Under the Code, the definition of "causer" includes the System Operator, and the Authority is therefore required to consider whether the System Operator's acts or omissions caused the UFE.
- 6.13 Any question as to whether the Code should be amended to exclude the System Operator as a potential causer is a matter of policy and is outside the scope of this final determination.
- 6.14 For completeness, the Authority notes that it does not agree with the System Operator's view as set out in paragraph 5.9(c) above. The Authority's decision paper stated that its decision was to include all participants as potential causers of under-frequency events³. The objective of the amendment, as stated in the consultation paper, was to "ensure that all relevant parties who could potentially cause a UFE are included under the UFE causer provisions in the Code"⁴.

The omission to issue instructions caused the UFE

- 6.15 On the day of the UFE, a planned outage of HAY Bus D was scheduled. Before an outage, the System Operator typically issues permissions and instructions to the grid owner.

³ [Part 8 Code terminology and network information](#) decision paper, page 12.

⁴ [Part 8 Code amendment proposal – Part 1](#), page 27, para 5.12.

- 6.16 The grid owner's HVDC Bipole Operating Policy (TP.OG 48.02) sets out how the HVDC link is to be operated. The System Operator's operating procedures (PR-DC-663) translate these requirements into operational steps for GACs. TI-DP-1139 is a temporary instruction derived from these documents, specifying the steps for this particular outage (included in Appendix B).
- 6.17 This temporary instruction was issued on 4 July 2025 and is owned by the System Operator. The temporary instruction specifies that, prior to removing Bus D from service, the Energy Coordinator at the System Operator's NCC is to instruct the grid owner to set:
- (a) HPC Roundpower to Monopole at HAY
 - (b) HPC Switch Level to Increased at HAY.
- 6.18 However, the System Operator deemed the steps in the procedure unnecessary due to the temporary operating conditions at the time and decided not to instruct the GAC to apply the correct control settings.
- 6.19 This decision by the System Operator was made without any involvement by the grid owner. An one hour before the planned outage, the security coordinator telephoned the GAC and informed them that the Energy Coordinator would not be issuing instructions to set HPC Roundpower to Monopole, or HPC Switch Level to Increased (as stated in the temporary instruction). The Authority has reviewed the voice recording of this communication.
- 6.20 It was confirmed in the conversation that the GAC would proceed with the sequence to remove Bus D from service at 8.00am without receiving instructions regarding HPC Roundpower and Switch Level settings from the NCC Energy Coordinator. The GAC confirmed their understanding by repeating back the Security Coordinator's message.
- 6.21 The GAC acting on instruction by the System Operator's Energy Coordinator, in respect of the control settings to be applied, is consistent with the standing written temporary instruction which required the Energy Coordinator to issue those instructions. Permission to proceed for HAY Bus D was issued by the Energy Coordinator at 7.38am.
- 6.22 The Authority has determined that the reason this event occurred is because the System Operator incorrectly decided that the HPC settings included in the standing procedure (TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages) could be omitted on this occasion. The System Operator's decision to not issue an instruction to apply the prescribed HPC setting changes prior to removing HAY Bus D from service led to a reduction of electricity supply through the HVDC and consequently, the UFE event on 11 July 2025.

7 System Operator meets the definition of causer

- 7.1 The Authority's final determination is that the System Operator meets the definition of causer in the Code. A causer in relation to an under-frequency event, means:
- (a) if the UFE is caused by an interruption to or reduction of electricity supply, or an increase in electricity demand, from a single participant's asset or assets, the participant, unless another participant's act or omission or property causes the interruption to or reduction of electricity supply or the increase in electricity demand, in which case the other participant is the causer.
- 7.2 The causer definition does not require fault or negligence. It asks a factual question: whether a participant's act or omission caused the interruption to or reduction of electricity supply. The System Operator's decision not to issue the HPC instructions specified in TI-DP-1139 caused the reduction in HVDC transfer. Whether that decision was made in good faith, based

on a reasonable assessment of operational conditions, or in reliance on other temporary instructions (TI-DP-1195), does not alter the causation analysis.

8 Megawatts lost due to the event

- 8.1 Clause 8.64 of the Code sets out how to calculate the event charge payable by the causer of a UFE. This, in turn, enables calculation of the rebates paid for UFEs under clause 8.65 of the Code.
- 8.2 Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points because of the UFE. The System Operator determines the MW lost as part of its investigation into a UFE.
- 8.3 The System Operator has determined that the electric power lost as a result of the 11 July 2025 event was 119.84MW, resulting in an event charge of \$74,800.
- 8.4 The System Operator's calculation of the MW lost for this event is included in the causer report (**Appendix A**). The System Operator's calculation does not form part of the Authority's final determination. However, the Authority acknowledges that the calculation is central to determining the UFE charge payable by the causer, and therefore also to the rebate (calculated by the clearing manager) paid for a UFE.

As part of its submission to the draft determination, the System Operator confirmed 119.84MW was lost from the power system as a result of the event.

9 Next steps

- 9.1 Under clause 8.62, any participant who is substantially affected by this final determination may dispute the determination by referring the matter to the Rulings Panel. The dispute must be raised in writing to the Rulings Panel within 10 business days of the publication of this final determination.
- 9.2 If no dispute is lodged with the Rulings Panel, the determination becomes final. The Authority will then notify the clearing manager of the outcome and the MW lost so that an event charge can be imposed on the causer and rebates applied to those allocated availability costs from the event.

10 Attachments

- 10.1 The following appendices are attached to this paper:
 - **Appendix A** System Operator causer report
 - **Appendix B** Draft determination
 - **Appendix C** System Operator submission on draft determination

Appendix A - System Operator causer report

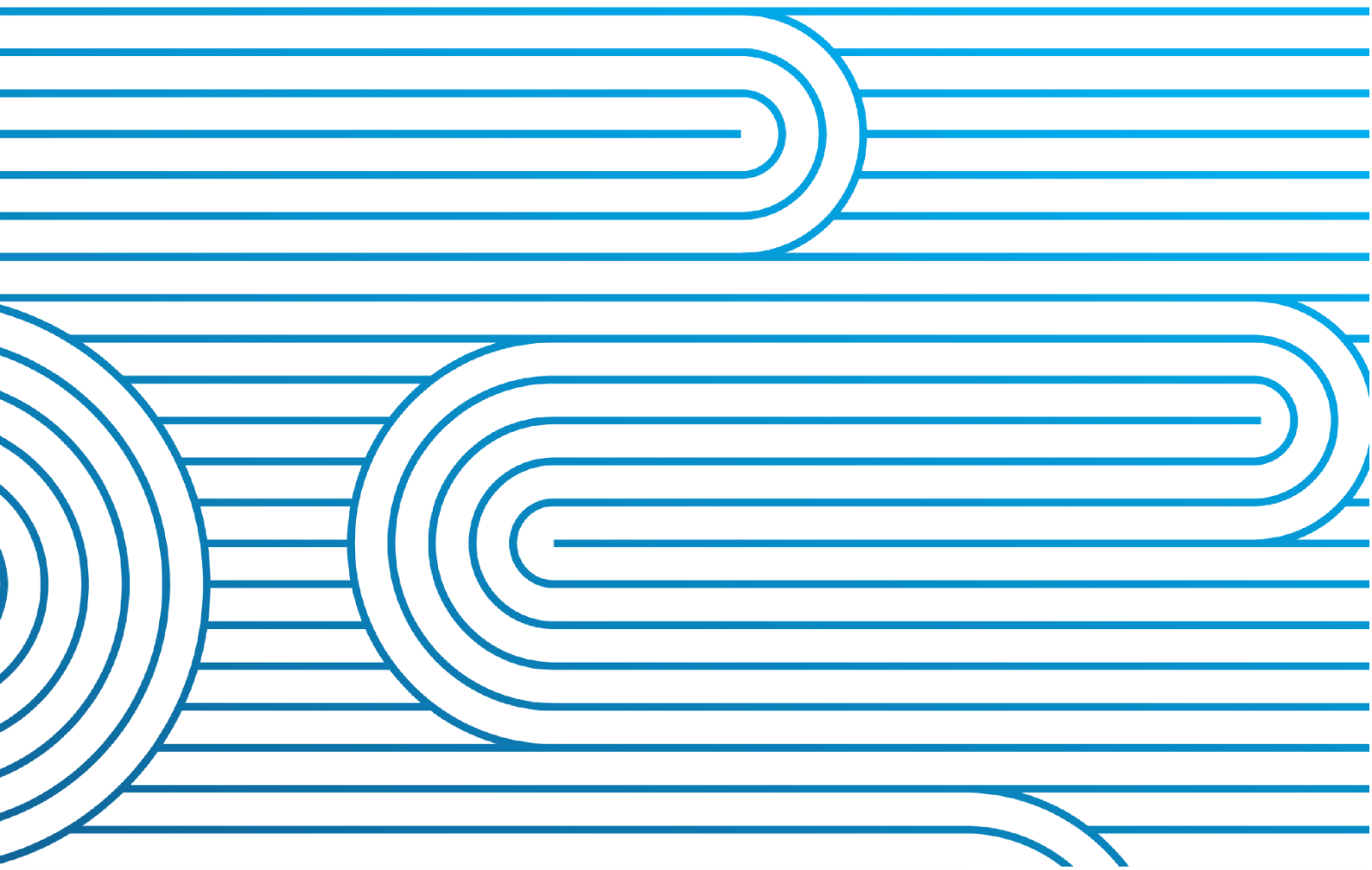
Causation Report

11 July 2025

Under-Frequency Event

System Operator event 4586 & 4587

1 October 2025



IMPORTANT

Disclaimer

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1 PURPOSE

On 11 July 2025 the system frequency in the North Island fell below 49.25 Hz, resulting in an under-frequency event (**UFE**).

Pursuant to clause 8.60 of the Electricity Industry Participation Code (**Code**), the System Operator investigated the event to assist the Electricity Authority (**Authority**) in determining a causer of the under-frequency event.

This Causation Report is provided to the Authority pursuant to clause 8.60(5) of the Code and includes the following:

- The System Operator's recommendation of the causer of the under-frequency event.
- The System Operator's reasons for forming its view.
- The information considered in reaching this view.

2 EXECUTIVE SUMMARY

On 11 July 2025, a sudden ramp down in HVDC power transfer from 178 MW to 68 MW into the North Island caused the frequency to drop to 49.24 Hz at 13:04:36.

Investigations by the System Operator have identified the root cause of this UFE is incorrect HVDC Harmonic Performance Control (HPC) settings for a split bus configuration which led to an HVDC power limit being applied.

2.1 RECOMMENDATION OF UFE CAUSER

In accordance with clause (a) of the definition of “causer” in Part 1 of the Code, the System Operator recommends that Transpower in its capacity as Grid Owner be found as the causer of the UFE.

2.2 OTHER RECOMMENDATIONS

The investigation involved reviewing the HVDC control settings under a specific bus configuration and reviewing Transpower internal operations procedures, involving both the System Operator and Grid Owner, and the communications between them.

This investigation has raised some procedural areas for further review and consideration, in particular:

- System Operator and Grid Owner control room communications and decision making process on deviations from HVDC operating procedures.
- Deviations from procedures beyond HVDC operating procedures. It is critical that operators of the power system remain empowered to make operational decisions, particularly in emergencies. However, this event indicates that there is value in reviewing how operators (in both the System Operator National Coordination Centre (**NCC**) and the Grid Owner’s National Grid Operating Centre (**NGOC**)) make decisions that result in deviations from procedures or policy, particularly for complex technologies.
- The adequacy of controls around deviations that present a potential risk and/or require more in-depth analysis and additional approval steps before proceeding.

3 SYSTEM EVENT – 11 JULY 2025

3.1 PARTICULAR ASPECTS OF THIS EVENT

Most UFEs are caused by a fault which results in a disconnection of generation or the HVDC. Assessment of these types of events focuses on electrical faults and associated protection operations of generators and/or the Grid Owner to identify the causer.

In this event, the trigger for the UFE was a sharp reduction in HVDC transfer to the North Island caused by an HVDC power limit being applied. An HVDC power limit below the existing power transfer MW will automatically ramp down the power transfer between the two islands to ensure system stability and prevent overloads or voltage excursions.

In this case, the assessment involves the following considerations:

- HVDC control system settings, under a specific bus configuration.
- Transpower's internal procedures, involving both the System Operator and the Grid Owner, and the communications between them. No other parties have been identified.

These considerations mean that this investigation focused on the actions and decision making by both the System Operator and Grid Owner. At the start of this investigation process we acknowledged and declared to the Authority the conflict of interest that this presents for the System Operator, and we have managed this assessment as required under the Code and with the necessary internal information barriers in place.

3.2 BACKGROUND INFORMATION

In order to assist the Authority, some background information is included to help explain how the internal procedures and the interactions between the System Operator and Grid Owner work.

3.2.1 HVDC Operations

The HVDC is operated by the Grid Owner's National Grid Operations Centres (NGOC). The HVDC Bipole Operating Policy¹ is the operating standard used by the NGOC to direct the operation of the HVDC. It also provides information to the System Operator of the HVDC capability and standard operating procedures. Other procedures, involving both NGOC and the System Operator's National Coordination Centres (NCC) set out the roles and responsibilities of the operators in both centres. These are referenced later in this report.

These documents include instructions on configuration and control settings for different HVDC equipment outages.

3.2.2 Bus outage during this event and associated configuration and control settings

The UFE occurred during a planned outage of Bus D at Haywards (HAY). The removal of Bus D splits the 220 kV bus. Figure 1 below shows the bus layout, indicating buses A, B and C are separated electrically (split) when Bus D is removed from service (i.e. is on outage).

¹ TP.OG 48.02 HVDC: Bipole Operating Policy, Issue 18

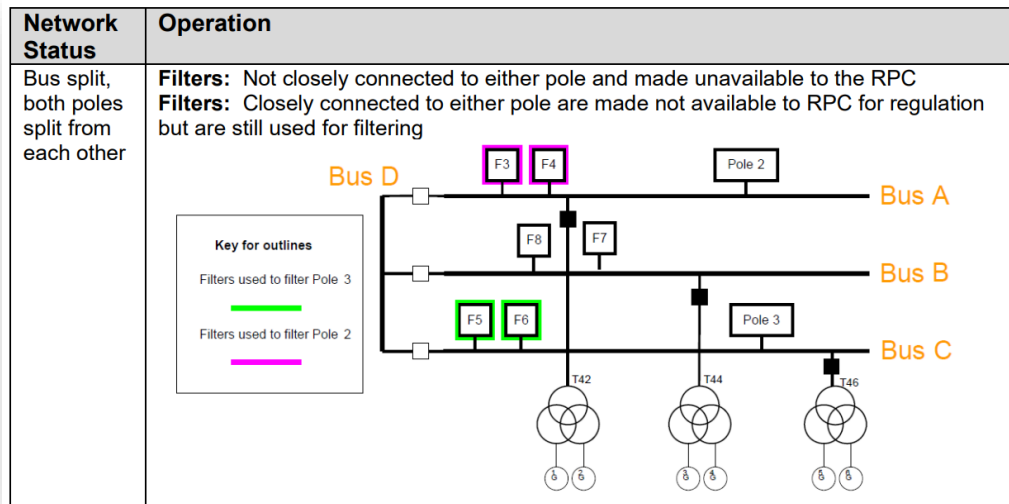


Figure 1: Bus D removed, splits the 220 kV bus

3.2.3 NGOC and NCC outage procedures and relevant control settings for this outage

Before transmission assets (including HVDC equipment) are taken out of service, the NCC operators, who are responsible for both energy dispatch and system security, issue permissions and potentially instructions to NGOC. This is to enable outages to be coordinated across the system and for NCC to perform security checks ahead of outages, before outages proceed.

In the case of the Bus D outage these instructions and the NGOC actions were a standing written temporary instruction set out in *TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*.

Under this procedure, before the 220 kV bus is split, NCC instructs the NGOC operators to set the following configuration for the HVDC in relation to the Harmonic Performance Control (HPC).

1. HPC Roundpower to Monopole at Haywards.
2. HPC Switch Level to "Increased" at Haywards.

NCC operators then instruct NGOC to proceed with the outage.

These requirements for a split bus configuration are specified in *TP.OG 48.02 HVDC: Bipole Operating Policy*, Issue 18. The HVDC can still run in bipole operation with a split bus, but the Reactive Power Controller (RPC) will try to maintain control of each bus independently, and if it cannot control voltage or harmonic filtering requirements, this may result in equipment tripping or a limit being applied to the HVDC transfer.

3.3 SITUATION PRIOR TO THE UNDER-FREQUENCY EVENT

The following context helps to explain the conditions leading up to the UFE.

Prior to the Bus D outage, there was communication between NCC and NGOC about **not** selecting HPC Round power to Monopole at HAY and **not** selecting HPC Switch Level to "Increased" at HAY.

The key driver for this deviation from the procedure was due to an assessment by NCC, communicated to NGOC ahead of the outage, that these steps appeared to be unnecessary due to the temporary operating conditions at the time.

These temporary operating restrictions at Haywards required some filters to be switched in manually and left in service and not available to the RPC. All filters at Haywards were not available to the RPC. As the RPC could not automatically switch out filters, a decision was made to omit the steps. Further details about the reasoning and contributing factors behind this decision are provided in Section 3.5.

Bus D was then taken out of service at 08:02.

3.4 THE UNDER-FREQUENCY EVENT

During the outage of Bus D at Haywards, at 13:04, the HVDC ramped down to 68 MW from a pre-event transfer of 178 MW². As the HVDC was transferring power north, the sudden ramp down to 68 MW caused the frequency to drop to 49.24 Hz at 13:04:36, triggering the UFE. The MW lost during the HVDC runback was 119.84 MW which was lower than the highest risk in the North Island at the time of the event. The following diagram shows the PMU data for HVDC MWAC and frequency in the North Island³.

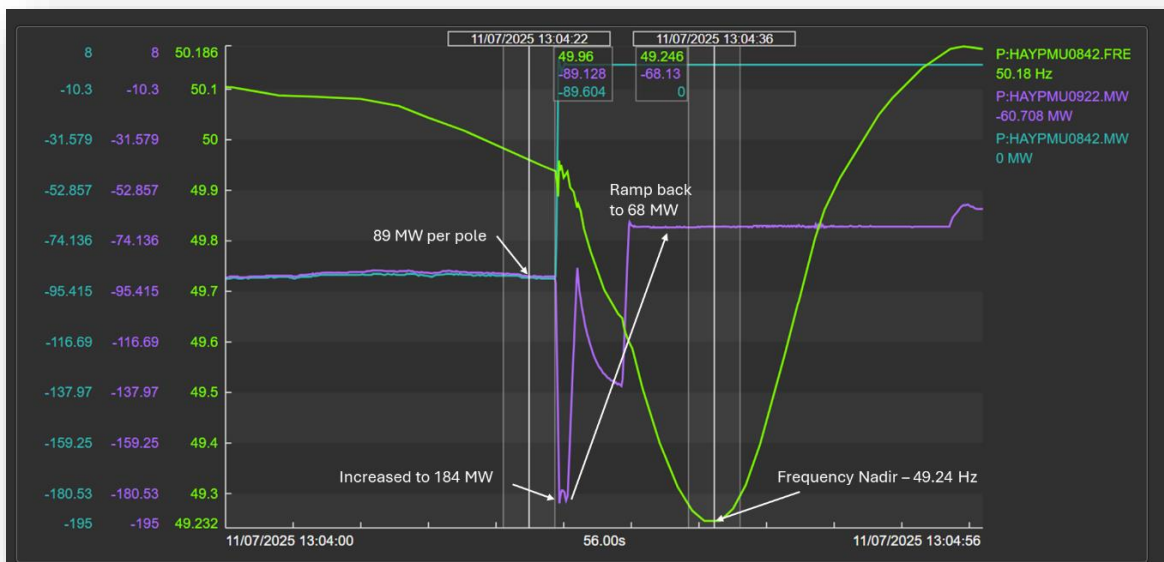


Figure 2: Frequency and HVDC injection at Haywards.

In response, temporary HVDC constraints were applied at 13:12 to limit dispatch while the cause of the run back was being identified. Once identified, NGOC requested an instruction from NCC to select HPC Round power to Monopole at 13:13 — 9 minutes after the event. By 13:40, all constraints were removed, and normal dispatch resumed.

² The graph and MW values were obtained from PMU data where there VTs are located on the AC side of the HVDC transformers.

³ Note the frequency in the South Island increased to 50.7 Hz.

3.5 EVENT INVESTIGATION

The System Operator undertook an investigation taking into account System Operator data and information as well as information provided by the Grid Owner. Details of this investigation are provided in the attached System Operator Engineering 26 September 2025.

The investigation found that the trigger for the UFE was the ramp down of the HVDC transfer north when a power limit was applied by the HVDC control system.

The root cause for the power limit being applied was a failure to select key control settings for the HPC – **not** selecting HPC Round power to Monopole at HAY and **not** selecting HPC Switch Level to “Increased” at HAY.

This decision was based on an assessment by NCC, and communication between NCC and NGOC prior to the outage. The HVDC controls are complex and as a result the impact of the decision to **not** instruct the configuration may not have been fully understood by both the NGOC and NCC individuals involved, particularly as there were temporary operational limitations on Haywards filters.

There are other contributing factors which increased the likelihood of the event:

1. The complexity of the HVDC control systems. The HVDC has filtering requirements which specify which filters are required to be in service at Haywards and Benmore, and depends on the HVDC MW transfer and if operating in bipole or monopole. The roundpower functionality defaults to bipole filtering requirements, but the operators can select to use monopole filtering requirements when only one pole is in operation; this is often done to help manage AC voltage as the Reactive Power Controller (RPC) requires fewer filters in service. In this case, all Haywards filters were in manual and not available to the RPC. The RPC has the ability to automatically switch filters based on the requirements of the HVDC. As the RPC could not automatically switch out filters, the usual benefit of selecting monopole filter requirements would not be seen. It was not anticipated that by omitting to select this, the HVDC would still apply bipole filtering requirements during monopole operation - despite the 220kV bus split - and having insufficient filters on the one bus section would trigger a power limit and therefore ramp down.
2. Operational limitations imposed by *TI-DP 1195 HVDC filter operating restrictions* contributed to the decision-making process. Operational restrictions at Haywards required some filters to be switched in manually and left in service and not available to the RPC. All filters at Haywards were not available to the RPC.

3.6 RECOMMENDATIONS FOLLOWING EVENT INVESTIGATION

Since this event Transpower, Operations Division has updated TI-DP-1139 to prevent this *specific event* from reoccurring.

This investigation has raised some procedural areas for further review and consideration, in particular:

- System Operator and Grid Owner control room communications and decision making process on deviations from HVDC operating procedures.
- Deviations from procedures beyond HVDC operating procedures. It is critical that operators of the power system remain empowered to make operational decisions, particularly in emergencies. However, this event indicates that there is value in reviewing how operators (in both NCC and NGOC) make decisions that result in deviations from procedures or policy, particularly for complex technologies.
- The adequacy of controls around deviations that present a potential risk and/or require more in-depth analysis and additional approval steps before proceeding.

4 RATIONALE FOR CAUSER RECOMMENDATION

The assessment confirms that the sudden ramp down of the HVDC to 68 MW caused the frequency to drop to 49.24 Hz at 13:04:36, triggering the UFE. This investigation found no other events that contributed to this UFE.

The reason for this ramp down, and the root cause of the UFE, was the incorrect control settings in place for the bus outage which began earlier in the day. The correct settings should have been actioned by the Grid Owner, following an instruction by the System Operator.

The HVDC assets, including the control systems, are owned by the Grid Owner and physically operated by the NGOC. The Grid Owner's HVDC Bipole Operating Policy sets out the Operating Standard for the HVDC equipment. Coordination of configuration changes is managed through internal procedures involving both NGOC and NCC.

The Grid Owner was asked if it considered itself to be the causer of the under-frequency event. The Grid Owner does not believe it caused the under-frequency event.

The Grid Owner considers that the System Operator is the causer. The Grid Owner says that NCC did not instruct NGOC to change settings and that the Grid Owner acts only "under instruction".

The System Operator acknowledges that it communicated with the Grid Owner, ahead of the outage, about **not** instructing the Grid Owner to select HPC Round power to Monopole at HAY and selecting HPC Switch Level to "Increased" at HAY. However, the System Operator believes that the Grid Owner:

- is better placed than the System Operator to know how to operate the HVDC and;
- should be well informed about the operational limits of its equipment and;
- had an opportunity to disagree with the System Operator about **not** selecting HPC Roundpower to Monopole at HAY and **not** selecting HPC Switch Level to "Increased" at HAY and notes that the Grid Owner's HVDC Operator did not disagree.

The System Operator believes there is no clear Code or other legal basis for the Grid Owner to claim in this case that it was compelled to follow any advice and/or suggestion of the System Operator in relation to the Grid Owner's asset or that it required an "instruction" to be able to act. The Grid Owner has confirmed, in their response, that they have the capability to question a decision should it appear incorrect.

The System Operator acknowledges that it played a role in the decision to not select HPC Round power to Monopole at HAY and not select HPC Switch Level to "Increased" at HAY, but does not agree that the role it played meets the threshold required by the definition of causer under the Code.

The System Operator's recommendation is therefore that the causer is Transpower as Grid Owner.

5 CALCULATION OF MW LOST

The purpose of this calculation is to determine the MW value provided to the clearing manager for the under-frequency event charge.

The System Operator follows the procedure 'Calculating the Amount of MW lost' (PR-RR-017) to determine the MW lost. This procedure follows the formula set out in clause 8.64 of the Code for calculating an event charge.

The event charge payable by the causer of an under-frequency event (referred to as "Event e" below) must be calculated in accordance with the following formula:

$$EC = ECR \times \left(\sum_y (INT_{y,e} \text{ for all } y) - INJ_D \right)$$

where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJ_D is 60 MW

$INT_{y,e}$ is the electric power (expressed in MW) lost at point y by reason of Event e (being the net reduction in the injection of electricity (expressed in MW) experienced at point Y by reason of Event e) excluding any loss at point y by reason of secondary Event e

y is a point of connection or the HVDC injection point at which the injection of electricity was interrupted or reduced by reason Event e

As the ECR and INJ_D values are constants the values to calculate and complete the formula are y and $INT_{y,e}$.

Using the event charge formula the calculation is as follows:

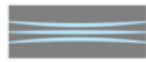
Event Charge = \$1,250/MW * (119.84 – 60MW)

Event Charge = \$74,800

6 CORRESPONDENCE

6.1 RESPONSE FROM THE SYSTEM OPERATOR

6.1.1 Memo to the System Operator:



TRANSPower

Waikoukou
22 Boulcott Street
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Wellington 6140
New Zealand

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Date: 24/07/2025

To: Chantelle Bramley
Cc: Samantha Naidoo
From: Ivani Molver

Subject: Investigation – 11 July 2025 under-frequency event

As you are aware, at 13:04 on 11 July 2025 an under-frequency event occurred in North Island as the frequency dropped to 49.24 Hz, which is below the threshold defined in the Code i.e. 49.25 Hz. PSG is currently investigating the event, and we have identified the following information as relevant in assessing the actions of the System Operator in relation to this event:

- PR-DC-663 HVDC Operator ~~Bipole~~ Operating Procedures states that the input to setting HPC Round power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).
 - SO to confirm if this is the correct procedure that defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level.
- Responsibilities:
 - SO to confirm if the responsibility sits with the Energy Coordinator (System Operator) to only send the instruction for setting HPC Round Power and HPC Switch Level to the HVDC Operator (Grid Owner)?
 - Is it correct to state if no instruction is sent, the previous instruction or setting for HPC Round Power and HPC switch level would be retained?
 - Who is responsible for ensuring that the HVDC is offered with the correct configuration?
- TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.
 - It is assumed that NCC staff were aware of this document. SO to confirm this and to also confirm that the Energy Coordinator was aware of the need to:
 - Instruct HPC Round power to Monopole at HAY.
 - Instruct HPC Switch Level to Increased at HAY.
 - SO to confirm what instruction was sent to the HVDC operator at NGOC?
- At the time of the event, the Bus D at Haywards was on outage. The System Operator ~~NMData~~ event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.
 - SO to confirm its criteria for identifying negotiable and non-negotiable steps when instructing a deviation from a joint SO/GO procedure or a GO procedure.
 - SO to confirm that when instructing a deviation from a joint SO/Asset Owner procedure or an Asset Owner procedure, the SO uses the same process and criteria with Asset Owner as it does with the GO.

- SO to confirm what the intended benefits were of the proposed deviation.
- Accountabilities: The SO to confirm who it thinks is accountable for the results i.e. the HVDC ramp down which resulted in an under-frequency event?
- The SO to form a view as to whether or not the SO could have been the causer of the under-frequency event as per the Code.

PSG will need this information by **COB on Wednesday, 21 August 2025** to be able to complete its investigation. The information provided in response to the questions above will be used in the SO recommendation to the Electricity Authority on who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

6.1.2 Response from the System Operator:

From: Ivani Molver
Sent: Tuesday, 5 August 2025 4:18 pm
To: Matthew Hansen; Samantha Naidoo
Cc: Katherine Moore
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Thanks Matt

Kind Regards

Ivani Molver (She/Her)
Power Systems Engineer
SO Power System Group | Operations

Transpower New Zealand Ltd.
Waikoukou, 22 Boulcott St, PO Box 1021, Wellington 6140
M: +64 21 229 7260
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From: Matthew Hansen <Matthew.Hansen@transpower.co.nz>
Sent: Tuesday, 5 August 2025 3:58 pm
To: Ivani Molver <Ivani.Molver@transpower.co.nz>; Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>
Cc: Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

There is multiple documents / procedure that feed into this process that all have different owners, the GO is responsible for the Bi-pole policy and the SO for the temporary instructions. Noting none of the written process that formed part of this event where wrong ! just missing the why which is why the SC questioned the process as he did not fully understand they why.

Matt

From: Ivani Molver <Ivani.Molver@transpower.co.nz>
Sent: Tuesday, 5 August 2025 9:33 am
To: Matthew Hansen <Matthew.Hansen@transpower.co.nz>; Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>
Cc: Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Good morning Matt,

Thank you for the information. Like Sam, I am also going through the information. However, could you clarify question 11.

The intention of the question was to ensure that there is no formal governance around responsibility and accountability where accountability is pre-determined for the procedure. Note, it is common practice internationally to have a pre-determined responsible and accountable party for procedures, standards and processes and I needed to confirm or rule this out. From your response, I have gathered that there is no pre-determined accountability for the procedure. Please correct me if I am wrong.

Thanks again for the time in getting this response to us in a speedy fashion.

Kind Regards

Ivani Molver (She/Her)
Power Systems Engineer
SO Power System Group | Operations

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From: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>
Sent: Monday, 4 August 2025 5:14 pm
To: Matthew Hansen <Matthew.Hansen@transpower.co.nz>; Ivani Molver <Ivani.Molver@transpower.co.nz>
Cc: Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Thanks for getting all this to us Matt – still going through it.

Will be in touch.

Thanks
Sam

From: Matthew Hansen <Matthew.Hansen@transpower.co.nz>
Sent: Monday, 4 August 2025 11:55 am
To: Ivani Molver <Ivani.Molver@transpower.co.nz>
Cc: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>; Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

1. Time line of event

10th July

During the pre-outage checks the Security Support Coordinator identified a potential inefficacy for the planned HAY 220kV bus zone and CB fail work which removed two of the ABB HVDC filters (HAY F4A and F4B) and HAY bus D (creates a split 220kV bus). Starts discussion within team and Ops planning

- 1.1. 11th July
- 1.2. 06:15 Security Coordinator discusses upcoming outage with his team, The Security Coordinator included a discussion around the HAY D bus outage and if selecting HPC Round Power to Monopole was necessary due to the temporary operating restrictions on the Siemens filters and the fact every available filter was already in service. Believing it was a way to reduce complexity and simplify the switching It was decided not to proceed with selecting HPC Round Power to Monopole and HPC switch level to increase at HAY and his belief the step of selecting HVDC
- 1.3. 06:50 Security Coordinator advised off-duty Operations manager who came into the control room of the intention not to select the HPC during the D Bus outage, the Operations Manager who did not raise objections as the SC logic seemed sound.
- 1.4. 06:57 Security Coordinator rang and advised the HVDC operator prior to the outage, with no objections raised by the GAC
- 1.5. 07:38 PTP for HAY D bus issued
- 1.6. 08:00 HAY D bus outage started no issues

- 1.7. 13:04 HVDC run back to 70MW (from approx. 200MW). NI frequency dropped to 49.24 Hz and SI frequency increased to 50.70 Hz
- 1.8. 13:06 TWI potline offload (reduction of approx. 170MW off the South Island)
- 1.9. 13:12 The Energy Coordinator constrained the HVDC to the 70MW to ensure a secure dispatch could be maintained, while the cause of the run back was being identified.
- 1.10. 13:13 The HPC Round power to Monopole was selected. (9 minutes after event)
- 1.11. 13:16 HVDC MW max of 70MW override removed and re dispatched. (12 minutes after event)
- 1.12. 13:16 HVDC MW max of 120MW override applied and re dispatched at 13:16 and remained in place until 13:40. This override was applied to limit the HVDC movement during a Tiwai offload that was in progress at the same time.
- 1.13. 13:19 TWI potline complete, MAN return to economic dispatch
- 1.14. 13:22 Energy Coordinator phoned IL providers and all IL load lost due to UFE was restored (18 minutes after event)
- 1.15. 13:40 HVDC MW max of 120MW override removed, dispatch returned to normal

From: Matthew Hansen
Sent: Friday, 1 August 2025 3:50 pm
To: Ivani Molver <Ivani.Molver@transpower.co.nz>
Cc: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>; Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Answers below in red, I will try pull a time line together next week.

Matt

From: Ivani Molver <Ivani.Molver@transpower.co.nz>
Sent: Friday, 1 August 2025 11:00 am
To: Matthew Hansen <Matthew.Hansen@transpower.co.nz>
Cc: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>; Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: Request for information - UFE 11 July 2025 (Involving the HVDC)

Kia ora Matt,

As you are aware, at 13:04 on 11 July 2025 an under-frequency event occurred in North Island as the frequency dropped to 49.24 Hz, which is below the threshold defined in the Code i.e. 49.25 Hz. PSG is currently investigating the event, and we have identified the following information as relevant in assessing the actions of the System Operator in relation to this event.

In our view, you may be able to answer the following questions in relation to the event. **Where you can answer the questions, can you please provide extracts of policies or procedures, or references to the relevant sections of documents. If you do not think you are the right person to answer a question, please contact me or Sam in the first instance.**

Here are the questions:

PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).

1. Can you confirm if this is the correct procedure that defines how NGOC HVDC Operator would set Round Power and HPC switch level? **Yes correct procedure, how to but not why or when**

2. Can you confirm if the responsibility sits with the Energy Coordinator (System Operator) to only send the instruction for setting HPC Round Power and HPC Switch Level to the HVDC Operator (Grid Owner)? **In normal operations yes instruction comes from EC, however during planned outages when PTP is given the GAC will do sub tasks when it is normal process to achieve the primary task**
3. Is it correct to state if no instruction is sent, the previous instruction or setting for HPC Round Power and HPC switch level would be retained? **Yes unless as above, it is part of a primary task covered by PTP**
4. Who is responsible for ensuring that the HVDC is offered with the correct configuration? And what document covers who is responsible for ensuring that the HVDC is offered with the correct configuration? **The Grid owner must offer the HVDC standard configuration (code requirement) which is done via TP.OG.48.02 bi-pole operating policy, the NGOC must offer any changes to availability or capacity (also code requirement) and covered by PR-AO-699 Management of grid owner offers and PR-SH 244 Manage and assess grid owner offers , however the SO will instruct the NGOC of the required HVDC configuration the best suits the current situation (should be within the grid owners offer) it the question was "Who is responsible for ensuring that the HVDC is operated offered with the correct configuration? Then this is the SC\EC who is responsible.**

TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.

5. We have assumed that NCC staff were aware of this document. Can you confirm this? **Yes the NCC team where aware if the TI and its content, but suspected the TI had an unnecessary step**
6. Can you also confirm that the energy coordinator was aware of the need to:
 - Instruct HPC Round Power to Monopole at HAY
 - Instruct HPC Switch Level to Increased to HAY

Yes was aware but instructed not to by the Security Coordinator

6. Can you confirm what instruction was sent to the HVDC operator at NGOC? **The TI's are made available to the GAC's, I cannot confirm if the GAC on the day had read it, Tony N should be able to check**

At the time of the event, the Bus D at Haywards was on outage. The System Operator NMData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.

7. Can you confirm the SO criteria for identifying negotiable and non-negotiable steps when instructing a deviation from a joint SO/GO or a GO procedure? **No, The Security Coordinator are empowered and trained to make operation disussions where they deem it is prudent to very form a documented plan or procedure. This is common practice and necessary as often errors in planning or process are not picked up until real time or system conditions have changed since the plan or process had been written.**
9. Can you confirm that when instructing a deviation from a joint SO/Asset Owner procedure or an Asset Owner procedure, the SO uses the same process and criteria with Asset Ownes as it does with

the GO. They are trained to treat all asset owners the same, however many of the actions the security coordinator will take is on behalf of the GO

10. What were the intended benefits of the proposed deviation?

Reduce complexity by removing tasks believed to be redundant due to operational limitations imposed by "TI-DP 1195 HVDC filter operating restrictions" and reduce risk of error

11. Can you confirm as per the relevant procedure/process who is accountable for the results (i.e. the HVDC ramp down which resulted in an underfrequency event?)

No, that should be determined by author of the causer report who has an independent view of the facts

Finally,

12. Can you please provide a timeline of events leading up to the UFE? This should include key decision points in 48 hours ahead of the UFE as well as the UFE.

Yes but will take some time to pull together

Thank you for your time in assisting us in our investigation.

Kind Regards

Ivani Molver (She/Her)

Power Systems Engineer

SO Power System Group | Operations

Transpower New Zealand Ltd.

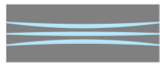
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6.2 RESPONSE FROM THE GRID OWNER

6.2.1 Letter to the Grid Owner:



TRANSPower

Waikoukou
22 Boulcott Street
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New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100

24 July 2025

Melanie Marr
Grid Compliance Manager
22 Boulcott Street, Wellington

Dear Melanie,

11 July 2025 Under-Frequency Event

At 13:04 on 11 July 2025 an under-frequency event occurred in North Island as the frequency dropped to 49.24 Hz, which is below the threshold defined in the Code i.e. 49.25 Hz. We are investigating the event and require the following information from you:

- PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round Power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).
 - Can you confirm if this is the correct procedure that defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level?
- Responsibilities (tasks or duties assigned):
 - Can you confirm if the responsibility sits with the HVDC Operator (Grid Owner) to only correctly act on the instruction received from the Energy Coordinator (System Operator) to set HPC Round Power and HPC Switch Level?
 - Is it correct to state if no instruction is sent, the NGOC HVDC Operator has no instruction to act on and hence any previous instruction or setting for HPC Round Power and HPC switch level would be retained.
 - Who is responsible for ensuring that the HVDC is offered with the correct configuration?
- TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.
 - Was NGOC aware that this document states that the Energy Coordinator was supposed to instruct HPC Round Power to Monopole and HPC Switch Level to Increased at Haywards?
 - Did the HVDC operator at NGOC receive an instruction from the Energy Coordinator at NCC?
- At the time of the event, the Bus D at Haywards was on outage. The System Operator NMData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.
 - The HVDC is an asset that is offered. The configurations at which the HVDC can be offered is documented in TP.OG 48.02 HVDC: Bipole Operating Policy, Issue 18.
 - Why did NGOC agree to a configuration that is contrary to what is required in the HVDC Bipole Operating Policy?
 - Can you explain why a configuration that should not be applied is available in the HMI interface?

- Can you confirm if there are any GO documents (for example procedures, standards and/or guidance) that prevent this configuration from being offered?
- Accountabilities: Can you comment on who you think is accountable for the results i.e. the HVDC ramp to 70 MW which resulted in an under-frequency event?
- Could you provide any other information regarding the event and what you believe may have caused the under-frequency to occur on 11 July 2025.
- We have assessed the MW lost during the event as 119.84 MW at Haywards. Can you please confirm this assessment or provide data that indicates a different value of MW lost.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

Kindly provide the information by **COB on Wednesday, 21 August 2025**. The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

Ivani Molver
System Operator Investigator
Power System Engineer

CC:
Samantha Naidoo
Corporate Counsel-Compliance & Impartiality

6.2.2 Response from the Grid Owner:



TRANSPower

Waikoukou
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www.transpower.co.nz

15 August 2025

Ivani Molver
System Operator Investigator
22 Boulcott Street
Wellington

Subject: Response to 11 July 2025 Under-Frequency Event – Request for Information

Dear Ivani,

Thank you for your letter dated 24 July 2025 regarding the under-frequency event that occurred on 11 July 2025.

We acknowledge the importance of this investigation and appreciate the opportunity to provide the requested information. Please find our responses to all the questions outlined in your letter in Appendix A – Response to System Operator Queries Regarding 11 July 2025 UFE.

Should you require any clarification or further information, please do not hesitate to contact me.

Yours sincerely,

Melanie Marr
Grid Compliance Manager

CC:
Samantha Naidoo
Corporate Counsel – Compliance & Impartiality Manager

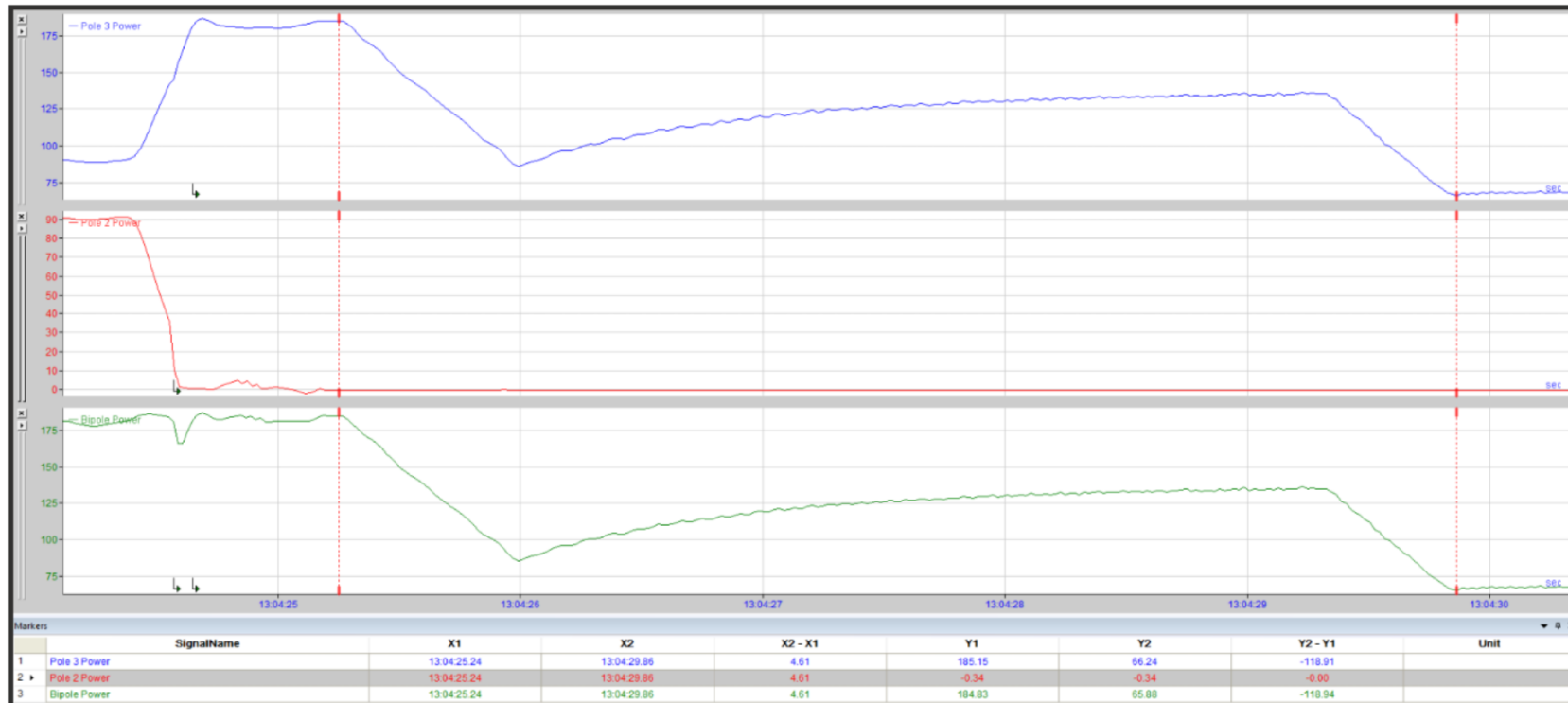
Appendix A – Response to System Operator Queries Regarding 11 July 2025 UFE

Reference	Question	Grid Owner's Reply
PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round Power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).	Can you confirm if this is the correct procedure that defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level?	Yes, PR-DC-663 HVDC Operator Bipole Operating Procedure defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level.
Responsibilities (tasks or duties assigned):	Can you confirm if the responsibility sits with the HVDC Operator (Grid Owner) to only correctly act on the instruction received from the Energy Coordinator (System Operator) to set HPC Round Power and HPC Switch Level?	Yes, the Grid Owner only acts on instruction from the Energy Coordinator (System Operator) regarding HPC Round Power and HPC Switch Level settings.
	Is it correct to state if no instruction is sent, the NGOC HVDC Operator has no instruction to act on and hence any previous instruction or setting for HPC Round Power and HPC switch level would be retained.	Yes, correct. Though the instruction is verbal and not electronically sent.
	Who is responsible for ensuring that the HVDC is offered with the correct configuration?	NCC (System Operator) holds responsibility. NGOC (Grid Owner) may question instructions or decisions if they appear incorrect.
TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.	Was NGOC aware that this document states that the Energy Coordinator was supposed to instruct HPC Round Power to Monopole and HPC Switch Level to Increase at Haywards?	Yes.
	Did the HVDC operator at NGOC receive an instruction from the Energy Coordinator at NCC?	No.

Reference	Question	Grid Owner's Reply
<p>At the time of the event, the Bus D at Haywards was on outage. The System Operator NMDData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.</p> <p>The HVDC is an asset that is offered. The configurations at which the HVDC can be offered is documented in TP.OG.48.02 HVDC: Bipole Operating Policy, Issue 18.</p>	Why did NGOC agree to a configuration that is contrary to what is required in the HVDC Bipole operating Policy?	NGOC followed guidance (instruction) from the System Operator's Security Coordinator (SC) during a discussion at 06:57 on 11/07/2025. The SC confidently advised that, since all filters were set to Manual and capacity was locked, switching to Monopole operation was not necessary and therefore, no instruction would be issued by the EC.
	Can you explain why a configuration that should not be applied is available in the Human Machine Interface (HMI)?	The configuration is available in the Human Machine Interface (HMI) because the SCADA system allows full operator control. This flexibility is common in SCADA systems and is managed through operator training and procedures. Currently, there is no automation in place to restrict Monopole or Bipole selections based on system status.
	Can you confirm if there are any GO documents (for example procedures, standards and/or guidance) that prevent this configuration from being offered?	Yes, the GO document TP.OG.48.02 HVDC Bipole Operating Policy provides guidance that affects configuration options. Specifically, Section 4.7.6.2 states that if Roundpower mode is enabled during a 220 kV split bus event, the 'HPC Round Power' filtering must be set to 'Monopole'.
	Can you comment on who you think is accountable for the results i.e. the HVDC ramp to 70 MW which resulted in an under-frequency event?	The System Operator is accountable for the results. The decision not to change the 'HPC Round Power' setting to 'Monopole' was made by the NCC's SC and NCC's EC did not instruct the NGOC to change settings. The Grid Owner acts under instruction.
	Could you provide any other information regarding the event and what you believe may have caused the under-frequency to occur on 11 July 2025.	
	We have assessed the MW lost during the event as 119.84 MW at Haywards. Can you please confirm this assessment or provide data that indicates a different value of MW lost.	The Haywards transient fault recorder embedded in the HVDC controls recorded a loss of 118.94 MW at the HAY 220kV bus. This value is based on the under-frequency event starting at 13:04:25.24 and ending at 13:04:29.86.

Reference	Question	Grid Owner's Reply
		Please refer to Appendix B – HVDC Fault Recorder Graph: MW Loss at HAY 220kV Bus (11 July 2025) for the visual representation of this data.
	Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.	<p>We consider that the System Operator is the causer.</p> <p>The definition of “causer” is set out in Part 1 of the Code. Paragraph (a) provides that the participant whose asset or assets cause the interruption/reduction of supply, or increase in demand, is the causer <i>unless</i> another participant’s act or omission causes the interruption/reduction/increase, in which case the other participant is the causer.</p> <p>The System Operator is a participant. As set out above in response to earlier questions, the System Operator failure to instruct the grid asset controller to change the ‘HPC Round Power’ setting to ‘Monopole’, in a situation when the instruction should have been given (i.e. an omission by the System Operator) caused the reduction. As such, we consider the System Operator is the causer.</p>

Appendix B – HVDC Fault Recorder Graph: MW Loss at HAY 220kV Bus (11 July 2025)



Transpower New Zealand Ltd [The National Grid](#)

Appendix B – Draft Determination

Causer Report removed as it is included as an Appendix to the Final Determination

Draft determination of causer: 11 July 2025 under- frequency event

Consultation paper

Executive summary

An under-frequency event (UFE) occurred on 11 July 2025. The purpose of this paper is to set out the Electricity Authority Te Mana Hiko's (Authority) draft determination of causer for the UFE. It invites feedback from affected industry participants on the draft determination of causer and the System Operator's calculation of megawatts of power lost during the event.

The normal frequency band in the New Zealand power system is between 49.8Hz and 50.2Hz. A UFE occurs when the frequency falls below 49.25Hz because of a loss of more than 60 megawatts (MW) of power injected into the grid.

The Electricity Industry Participation Code 2010 (Code) requires the Authority to determine the causer of a UFE and sets out the process for making the determination.

The Authority's draft determination is that the System Operator was the causer of the 11 July 2025 UFE

On 11 July 2025 at about 1.04pm, there was a sudden ramp down of the HVDC power transfer to the North Island grid, from 178MW to 68MW, which caused the North Island system frequency to drop to 49.24Hz, resulting in a UFE.

The Authority's draft determination is that Transpower New Zealand Limited as the System Operator was the causer of the 11 July 2025 UFE. The reasons for the draft determination are:

- (a) During a planned outage of 220 kV Bus D at Haywards substation (HAY), the HVDC northward transfer power ramped down from 178MW to 68MW. This sudden ramp down caused the North Island grid frequency to drop to 49.24Hz, resulting in the UFE.
- (b) The ramp down occurred because incorrect control settings were applied during the Bus D outage, which imposed a power limit on the HVDC.
- (c) These incorrect control settings were in place because the following key Harmonic Performance Control (HPC) settings were not applied:
 - I. selecting HPC Roundpower to "Monopole" at HAY
 - II. selecting HPC Switch Level to "Increased" at HAY.
- (d) As part of the process of removing transmission assets (including HVDC equipment) from service, the System Operator's National Coordination Centre (NCC) coordinators issue permissions, and potentially instructions, to grid asset controllers at the grid owner's National Grid Operations Centre (NGOC).
- (e) The System Operator's own standing temporary written instructions (*TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*) specify that the System Operator issues instructions to apply the correct control settings in respect of HPC Roundpower and Switch Level.
- (f) The System Operator deviated from its own written procedures and decided not to instruct the grid owner to apply the correct control settings listed above.
- (g) About an hour before the scheduled outage, the System Operator informed the grid asset controller (GAC) by telephone, that it would not issue instructions to apply the correct control settings as it considered them unnecessary.
- (h) The System Operator issued permission to proceed with the existing control settings in place.
- (i) The failure to issue the instructions to apply the correct control settings resulted in a power limit being applied to the HVDC, which ultimately caused the UFE.

The System Operator's causation report identified the grid owner as the alleged causer of the UFE. This is disputed by the grid owner, who considers the System Operator to be the causer.

Although the UFE was resolved without widespread impact, the event exposed risks from procedural deviations and raised concerns about clarity and independence in operational decision-making.

Submissions are invited from affected parties

Under clause 8.61 of the Code, the Authority must consult with every participant substantially affected by a UFE on its draft determination before making its final determination. We invite affected participants to make a submission on our draft determination by 5pm, Friday 23 January 2026 to compliance@ea.govt.nz.

We also welcome feedback on the System Operator's calculation of the megawatts of power lost during the event, which the System Operator uses for calculating the UFE event charge.

After reviewing all submissions, the Authority will then make a final determination on the causer of the UFE.

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1. What you need to know to make a submission

What this consultation is about

- 1.1. This paper sets out the Electricity Authority Te Mana Hiko's (Authority) draft determination that the System Operator was the causer of the under-frequency event (UFE) at approximately 1.04pm on 11 July 2025.
- 1.2. It invites feedback from industry participants substantially affected by the UFE on the draft determination of causer and the System Operator's calculation of megawatts of power lost during the event.

How to make a submission

- 1.3. The Authority welcomes submissions in Microsoft Word in the format shown in **Appendix A** to compliance@ea.govt.nz with 'Consultation paper – UFE 11 July 2025' in the subject line by 5pm, 23 January 2026.
- 1.4. We will acknowledge receipt of all submissions via email. Please contact compliance@ea.govt.nz or 04 460 8860 if you do not receive acknowledgement of your submission within two business days.
- 1.5. If you cannot send your submission electronically, please contact the Authority (compliance@ea.govt.nz or 04 460 8860) to discuss alternative arrangements.
- 1.6. Please note the Authority intends to publish all submissions it receives. If you consider the Authority should not publish any part of your submission, please:
 - (a) indicate which part should not be published
 - (b) explain why you consider we should not publish that part, and
 - (c) provide a version of your submission the Authority can publish (if we agree not to publish your full submission).
- 1.7. If you indicate part of your submission should not be published, the Authority will discuss this with you before deciding whether to not publish that part of your submission.
- 1.8. However, please note all submissions received by the Authority, including any parts that the Authority does not publish, can be requested under the Official Information Act 1982. This means the Authority would be required to release material not published unless good reason existed under the Official Information Act to withhold it. The Authority would normally consult with you before releasing any material that you said should not be published.

The Authority will consider submissions and make a final determination

- 1.9. The Electricity Industry Participation Code 2010 (Code) requires the Authority to consult with every generator, grid owner and other participant substantially affected by a UFE event for a draft determination. The required consultation period is 10 business days. However, due to the Christmas and New Year holiday period, we have extended this until 23 January 2026.
- 1.10. The Authority will consider all submissions received and publish its final determination. Clause 8.62 of the Code sets out provisions for any disputes on the Authority's determination.

2. Introduction

- 2.1. Clauses 8.60 and 8.61 of the Code contain provisions for investigating and determining the causer of a UFE. The System Operator is required to investigate the causer of a UFE and provide a report to the Authority.
- 2.2. Where the causer of a UFE is not identified in the System Operator's report, or the alleged causer as identified in the System Operator's report denies it is the causer, the Authority must publish a draft determination that states whether a UFE was caused by a participant, and, if so, the identity of the causer.
- 2.3. The draft determination must include reasons for the findings.

3. The System Operator investigated the causer of the UFE

- 3.1. The System Operator's *Causation Report*, dated 1 October 2025, is attached as **Appendix B**.
- 3.2. The circumstances described in the report are summarised below:
 - (a) most UFEs are caused by a fault that results in a disconnection of a generation asset or the HVDC
 - (b) however, in this event, the UFE was caused by the sudden ramp down of the HVDC transfer into the North Island, when a power limit was applied by the HVDC control system
 - (c) an HVDC power limit that is lower than the existing power transfer level will automatically ramp down the power transfer between the two islands to ensure system stability and prevent overloads or voltage excursions
 - (d) on the day the UFE occurred, an outage of 220kV Bus D at Haywards (HAY) was planned
 - (e) for situations involving the outage of Bus D, there was a standing written temporary instruction set out in the System Operator document "*TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*" (**Appendix C**)
 - (f) this document requires the NCC to instruct the NGOC operators to set the configuration for the HVDC. Part of these instructions relate to when the Reactive Power Controller (RPC) switches in/out harmonic filters based on the HVDC power level. These settings are set as part of what is called the Harmonic Performance Control (HPC). The HPC settings were:
 - HPC Roundpower set to Monopole at Haywards
 - HPC Switch Level set to Increased at Haywards
 - (g) NCC coordinators then instruct NGOC to proceed with the outage
 - (h) the HVDC link can operate in this configuration, but the RPC will regulate the voltage of each remaining in-service bus independently. If it cannot control voltage or harmonic filtering requirements, this can result in equipment tripping or a power transfer limit being applied to the HVDC transfer
 - (i) prior to the Bus D outage, at 6.57 am, the NCC security coordinator called the NGOC HVDC controller and discussed not selecting HPC Roundpower to Monopole, and not selecting HPC Switch Level to Increased at HAY

- (j) the deviation from the procedure was due to an assessment by the NCC that these steps were considered unnecessary due to temporary operating conditions at the time
 - (k) Bus D was taken out of service at 8.02am on 11 July 2025.
 - (l) at about 1.04pm the UFE occurred. The cause of the UFE was the incorrect control settings in place at the time of outage
 - (m) after the cause of the UFE was identified, NGOC requested an instruction from NCC to select HPC Roundpower to Monopole
 - (n) this resolved the ramp down and at about 1.40pm all constraints were removed and normal dispatch resumed.
- 3.3. The System Operator asked the grid owner whether it considered itself to be the causer of this UFE.
- 3.4. The grid owner denies it is the causer and stated that it considers the System Operator to be the causer. The grid owner stated that NCC did not instruct NGOC to change the HPC Roundpower and Switch Level settings and that the grid owner only acts “under instruction”.
- 3.5. The System Operator acknowledges that it communicated with the grid owner prior to the outage about not instructing the grid owner to select HPC Roundpower to “Monopole” and selecting HPC Switch Level to “Increased”. However, the System Operator believes that the grid owner:
- (a) is better placed than the System Operator to know how to operate the HVDC
 - (b) should be well informed about the operational limits of its equipment
 - (c) had an opportunity to disagree with the System Operator about not selecting HPC Roundpower to Monopole at Haywards and not selecting HPC Switch Level to “Increased” at Haywards but did not do so.
- 3.6. The System Operator accepts that it played a role in the decision to not select HPC Roundpower to Monopole at Haywards and not select HPC Switch Level to Increased, but does not agree that the role it played meets the threshold required by the definition of causer under the Code.
- 3.7. The System Operator stated that the grid owner has no clear Code or other legal basis for it to claim it was compelled to follow advice or suggestions from the System Operator, or that it required an “instruction” to be able to act.
- 3.8. The System Operator recommended the grid owner be found to be the causer of the 11 July 2025 UFE.
- 3.9. The System Operator’s report also referred to recommendations following its investigation of the UFE. These related to reviewing decision making and operating procedures, and controls for deviations from procedures.

4. The grid owner disputes that it is the causer of the UFE

- 4.1. The grid owner does not accept that it was the causer of the 11 July 2025 UFE. Its position is that it operates under a framework in which the System Operator makes real-time operational decisions and issues instructions, and the grid owner implements those instructions. The grid owner’s position is summarised as follows:

- (a) **Obligation to act under instruction:** Transpower policy and procedures require NGOC operators to act only under NCC instructions, citing operational procedures such as QR-DC-664 *Acting on System Operator Instructions* and TP OG 41.01 *Operational Control of Power System Equipment*, which the grid owner considers require NGOC operators to follow instructions from the System Operator without discretion to override or challenge them. This is reinforced by clause 3(1) of Technical Code C of Schedule 8.3 of the Code, which mandates that every voice instruction must be repeated back and confirmed before being actioned. The use of the term “instruction” indicates a mandatory requirement.
- (b) **Acting under instruction consistent with roles and responsibilities:** NCC’s role is to operate the grid in order to meet the System Operator’s principal performance obligations as set out in Part 7 of the Code. NGOC’s role is to take actions in respect of grid assets to give effect to NCC’s decisions and instructions in respect of the operation of the grid.
- (c) **No authority to deviate:** no policies or procedures provide authority for the grid owner to override or refuse instructions from the System Operator. While it may raise concerns or seek clarification, it cannot substitute its own judgment for that of the System Operator.
- (d) **System Operator’s omission caused the UFE:** The System Operator decided not to issue an instruction to apply Harmonic Performance Control (HPC) settings prior to the Bus D outage. The grid owner asserts that this omission led directly to the HVDC power limit and subsequent UFE. Had the instruction been given to implement the two settings changes, the event would not have occurred.
- (e) **Expertise limitations:** NGOC operators are not required to be engineering experts with experience across the breadth of electrical systems on the grid. Their role is to implement instructions, not to assess or challenge operational decisions.

4.2. The grid owner concludes that under the Code’s definition of “causer”, the System Operator is the causer due to its failure to issue instructions which caused the UFE. It rejects the suggestion that its failure to challenge the System Operator’s decision makes it the causer, noting that no procedure or Code provision it is aware of grants it authority to override instructions.

5. The draft determination is the System Operator was the causer of the 11 July 2025 UFE

5.1. The Authority’s draft determination under clause 8.61 is that the System Operator was the causer of the UFE at approximately 1.04pm on 11 July 2025.

The Authority considered the circumstances of the UFE

5.2. The Authority has considered the System Operator’s report and correspondence with the grid owner and agrees with:

- (a) the description of the circumstances leading up to the UFE
- (b) that a UFE occurred at about 1.04pm on 11 July 2025.

5.3. The Authority does not agree with the System Operator’s finding that the grid owner was the causer of the UFE.

- 5.4. While the UFE was resolved without widespread impact, the Authority considers that the circumstances presented a risk of a much more significant event. This underlines the importance of adherence to procedures and robust decision-making processes where there is deviation from those procedures.

A procedure was in place but not followed

- 5.5. On the day of the UFE, a planned outage of HAY Bus D was scheduled. Before an outage, the System Operator typically issues permissions and instructions to the grid owner.
- 5.6. For planned outages of Bus D, the instructions and grid owner actions are documented in a standing written temporary instruction set out in *TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*. This temporary instruction was issued on 4 July 2025 and is owned by the System Operator. The temporary instruction specifies that, prior to removing Bus D from service, the energy coordinator (System Operator) is to instruct the grid owner to set:
- (a) HPC Roundpower to Monopole at HAY
 - (b) HPC Switch Level to Increased at HAY.
- 5.7. However, the System Operator deemed the steps in the procedure unnecessary due to the temporary operating conditions at the time and decided not to instruct the GAC to apply the correct control settings.
- 5.8. This decision by the System Operator was made without any involvement by the grid owner. Just one hour before the planned outage, the System Operator telephoned the grid asset operator and informed him that the energy coordinator would not be issuing instructions to set HPC Roundpower to Monopole, or HPC Switch Level to Increased (as stated in the temporary instruction). The Authority has reviewed the voice recording of this communication.
- 5.9. It was confirmed in the conversation that the grid asset controller would proceed with the sequence to remove Bus D from service at 8.00am without receiving instructions regarding HPC Roundpower and Switch Level settings from the NCC energy coordinator. The grid asset controller confirmed their understanding by repeating back the security coordinator's message.
- 5.10. The GAC acting on instruction by the System Operator in respect of the control settings to be applied, is consistent with the standing written temporary instruction which requires the System Operator to issue those instructions. Permission to proceed for HAY Bus D was issued by the System Operator at 7:38am.
- 5.11. This event has raised questions about the independence of the System Operator and the grid owner in operational decision-making. The deviation from established procedures, the System Operator's responsibility for issuing instructions for the correct control settings to be applied to the grid owner's asset, and the grid owner's acceptance of those instructions without challenge, highlights potential risks where operational roles and responsibilities may become blurred. The Authority considers that clarity and independence in decision making are critical to maintaining confidence in the integrity of system operations.

The Authority does not agree with the System Operator's causer finding

- 5.12. The Authority disagrees with the findings in the causer report that the grid owner was the causer of the UFE and considers the System Operator to be the causer.
- 5.13. The Authority accepts that the grid owner cannot override an instruction from the System Operator. This behaviour and relationship is underpinned by the System Operator and grid owner's respective roles and responsibilities, various operating procedures, and the Code.
- 5.14. The Authority considers that the System Operator should have followed its own procedure (as set out in *TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*) for removing HAY Bus D, by instructing the grid owner to apply the prescribed HPC setting changes.
- 5.15. When the cause of the UFE was identified, the grid owner requested an instruction from the System Operator to select HPC Roundpower to Monopole. This adds weight to the view that the grid owner can only act under instruction from the System Operator – if not, then the grid owner could have made the change without requesting an instruction.
- 5.16. The grid owner had an opportunity to question or seek further explanation for the deviation from the procedure, but did not do so. However, the grid owner has advised that its grid asset controllers are not required to be experts in electrical engineering and all the systems of the grid. In this context, it was reasonable for the grid owner to accept the System Operator's decision on the morning of the UFE that NCC's energy coordinator would not issue an instruction to apply the prescribed HPC setting changes at 8.00am, as previously planned.
- 5.17. The Authority considers the nature of the voice call at 6.57am was not that of a "discussion" as the System Operator described it in paragraph 3.2(i) above. More correctly, it was a communication to the NCOG GAC of a decision that had been made by the System Operator.

System Operator meets the definition of causer

- 5.18. The Authority's draft determination is that the System Operator meets the definition of causer in the Code. A causer in relation to an under-frequency event, means:
 - (a) if the UFE is caused by an interruption to or reduction of electricity supply, or an increase in electricity demand, from a single participant's asset or assets, the participant, unless another participant's act or omission or property causes the interruption to or reduction of electricity supply or the increase in electricity demand, in which case the other participant is the causer;
- 5.19. The definition of causer was replaced on 1 May 2025, which widened the scope of potential causers to include all participants which includes the System Operator. The previous definition of causer was limited to generators or grid owners.
- 5.20. The System Operator's decision to not issue an instruction to apply the prescribed HPC setting changes prior to removing HAY Bus D from service led to a reduction of electricity supply through the HVDC and consequently, the UFE event on 11 July 2025.

Q1. Do you agree with the draft determination that the System Operator was the causer of the UFE event on 11 July 2025 at approximately 1.04pm? If not, please advise your view on the causer and give reasons.

6. The System Operator has calculated the MW lost during the event based on its investigation

- 6.1. Clause 8.64 of the Code sets out how to calculate the event charge payable by the causer of a UFE. This in turn enables calculation of the rebates paid for UFE under clause 8.65.
- 6.2. Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points because of the UFE. The System Operator determines the MW lost as part of its investigation into a UFE.
- 6.3. The System Operator has determined the electric power lost as a result of the 11 July 2025 event was 119.84MW, resulting in an event charge of \$74,800.
- 6.4. The System Operator's calculation of the MW lost for this event is included in the report (Appendix A). The System Operator's calculation does not form part of the Authority's draft determination. However, the Authority acknowledges that the calculation is central to determining the UFE charge payable by the causer, and therefore also to the rebate (calculated by the clearing manager) paid for a UFE. The Authority invites comment on the System Operator's calculation of the MW lost.
- 6.5. Any comments received will be passed to the System Operator.

Q2. Do you agree with the System Operator's assessment that 119.84MW was lost from the power system in the 11 July 2025 UFE? If not, please advise your view on the MW lost and give reasons.

Appendix A Format for submissions

Submitter	
Questions	Comments
<p>Q1. Do you agree with the draft determination that the System Operator was the causer of the UFE at approximately 1.04pm 11 July 2025?</p> <p>If not, please advise your view on the causer and give reasons.</p>	
<p>Q.2 Do you agree with the System Operator's assessment that 119.84MW was lost from the power system in the 11 July 2025 UFE?</p> <p>If not, please advise your view on the MW lost and give reasons.</p>	

Appendix B - System Operator Causer Report

Document removed from published version as Causer Report is included as an Appendix to the Final Determination

Appendix C TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages



Section 1 Document Information

Temp Document ID No	TI-DP-1139	Issue Number: V13	Approval Status: Issued Date Last Changed: 4/07/2025
Document Title:	TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages		
Publish Date	Review Period:	Next Review Date:	Owner:
4/07/2025	3 Months	4/10/2025	Tim Connolly or Matthew Hansen

List of Procedures Affected by Temp Instruction

Procedure	Being Updated by
Click or tap here to enter text.	Click or tap here to enter text.

- 1.1 Purpose** This Instruction outlines how to manage HAY Bus Zone/CB Fail outages by splitting the 220kV buses via removal of Bus D.
-
- 1.2 Changes** Updated for outages on 09 July, 11 July and 14 July
-
- 1.3 Background** A lengthy program of work has commenced to replace HAY 220 kV Bus Zone and CB Fail protection. This requires a significant number of BZ/CBfail outages. This puts the total HAY 220 kV bus at risk for bus fault.
- Although not obligated to manage, it's been deemed reasonable and prudent to try and reduce the impact of such a fault by splitting the 220kV buses with approximately half the equipment connected to two different 220kV buses. This can then be easily achieved by removal of bus D with the protection outages.
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- 1.4 Equipment configuration** Equipment will be pre-selected onto two in-service buses (equipment is not to be spread amongst the three buses if this is a possible option). This will vary along with the two buses depending on Bus Zone /outage work.
- Outages: HAY SC1, F4A & F4B
- One bus (Bus A):
HAY WIL LTN 2, BPE PRM HAY 2, HAY T24, HAY T5 (SC 3, SC 4, R5), Pole 3 (T25), F5A&B, F6A
- Second Bus (Bus B):
HAY T1 (R1), HAY_WIL_LTN_1, BPE PRM HAY 1, HAY T2 (SC 2), Pole 2 (T23), T22, F3A & F3B
-
- 1.5 Items of note for Bus D outage** Bus D offered as out as an OPE and is effectively conditional. If security is compromised with Bus D out, due to any unplanned events etc, then the security coordinator is to request its return.
- Removal of Bus D**
- Round power mode remains enabled
 - RPC remains in automatic control
- Security Coordinator:



- Check conditions conducive to split bus configuration (no N-1 issues). Note loss of a bus will generally cause significant issues, but we're not managing for this outcome pre-event.

Energy Coordinator:

- Instruct HPC Round power to Monopole at HAY.
- Instruct HPC Switch Level to Increased at HAY.

Security Coordinator:

- Remove Bus D

RPC:

- The RPC sees 2 monopoles and switches in filters accordingly. Pole 3 should have a filter combination with a Monopole Rating Limit of 1001MW; for example, F3A&B and F6A.
- When either Pole is blocked, all filters on that pole's bus will be automatically set to Manual. Those filters will remain in Manual and cannot be selected to Auto until the pole is deblocked.
- At the start of a Bus D outage, if all filters on a single bus are out of service, one A and one B filter will need to be manually switched in to allow the associated pole to deblock.
- If filters remain in service and are not manually switched out, the pole will be able to deblock again.
- Once all filters are selected to Auto once a pole is deblocked, the RPC will look for available filters and switch them in if the HVDC transfer increases. If nothing changes with the Pole filters, it should have adequate filtering to automatically transition to Bipole or Roundpower operation.
- The RPC will switch filters in as they are required based on Monopole Performance Limits. However, redundant filters may not be switched out when the HVDC transfer decreases. This is because the RPC is looking at the inductive loading on the synchronous condensers and they are no longer tasked with returning STC31 to zero output (see next bullet point). For each pole, one A and one B filter will be sufficient up to 630MW bipole transfer with HPC Switch Level set to Increased. This means there will be a minimum of 4 filters in service.

It is safe to have the NGOC manually switch a redundant (third) filter out on the Pole 2 and/or Pole 3 bus once the bipole transfer drops below 500MW. This involves the filter being selected to Manual, switched out, and selected back to Auto.

- With each pole on its own 220kV bus (110kV bus solid):
 - STC31 controls the 220 kV bus it is connected to using the setpoint entered before the 220kV bus was split.
 - SC 1, 2, 3 & 4 condensers will try to zero STC31 however the condensers on 'the other bus', to STC31 may not regulate as expected. Each 220kV bus voltage may be different so awareness of VT locations/analogues may be required.
 - HAY T1, T2, T5 & WIL T8 Interconnectors will be in Manual (NARPC) and may have to be tapped manually to relieve 110 kV condensers (see below). Do not select to ARPC as they may hunt.



- SC 7, 8, 9, 10 condensers. Those with direct connection to 110kV bus will control the 110 kV voltage, otherwise will be in Manual (NARPC). Interconnectors may need to be manually tapped to alleviate condensers and regulate the 110kV bus voltage.

Modelling:

- HAY CB 408/418/428 will remain Forced Close = Yes.
- SPD/SFT will see a solid 220kV bus. SPD doesn't model flows accurately on the Poles (and therefore circuits) so there's risks with having it modelled separately. SFT check also won't have the correct configuration.

Contingencies

- Special contingencies HAYBUSA and HAYBUSB have been built in CTGS on 23/10. They won't be enabled but the two relevant contingencies can be loaded if SCs want to check for situational awareness purposes.
- If outages occur and/or N-1 issues start to appear for circuit contingencies then depending on the impact to HVDC transfer levels, returning Bus D could be the best course of action.
- As the GZ8 load is increasing going into colder season, HVDC north or south transfer with split HAY bus configuration is limited. If the HVDC is restricted because of the Bus D outage, then consider returning to service if weather conditions are suitable.

For example:

If generation or the HVDC must be reduced to resolve, then returning Bus D to service will usually be the best course of action.

Alternative options can be considered if there is a higher risk of bus faults occurring, i.e. strong winds, or if reducing HVDC transfer/generation by a small quantity alleviates an N-1 violation, and likely for a short duration, then this might be the preferred option.

Discuss with duty OM as required.

- Before returning Bus D ensure potential violations aren't resolvable by adjusting voltages and MVar flows. For example, if excessive Var flows are a significant contributor to an overload, check whether changing voltage/MVar dispatches on lower NI windfarms (that reduce flows through potentially overloaded equipment), will solve the violation.

Appendix D Definition of causer

causer, in relation to an **under-frequency event**, means—

- (a) if the **under-frequency event** is caused by an interruption to or reduction of **electricity** supply, or an increase in **electricity demand**, from a single **participant's asset** or **assets**, the **participant**, unless another **participant's** act or omission or property causes the interruption to or reduction of **electricity** supply or the increase in **electricity demand**, in which case the other **participant** is the causer; or
- (b) if the **under-frequency event** is caused by more than 1 interruption to or reduction of **electricity** supply or increase in **electricity demand**, the **participant** who, in accordance with paragraph (a), would be the **causer** of the **under-frequency event** if it had been caused by the first in time of the interruption to or reduction of **electricity** supply or increase in **electricity demand**; but
- (c) if an interruption to or reduction of **electricity** supply, or an increase in **electricity demand**, occurs in order to comply with this Code, the interruption to or reduction of **electricity** supply or the increase in **electricity demand** must be disregarded for the purposes of determining the **causer** of the **under-frequency event**.

Clause 1.1(1) **causer**: replaced on 1 May 2025, by clause 4(1) of the Electricity Industry Participation Code Amendment (Common Quality Related Amendments) 2025.

Appendix C – System Operator submission on draft determination

Submitter: System Operator

Q1. Do you agree with the draft determination that the System Operator was the causer of the UFE at approximately 1.04pm 11 July 2025? If not, please advise your view on the causer and give reasons.

No. For the reasons set out in the System Operator's Causation Report dated 1 October 2025 (re 11 July 2025 Under-Frequency Event) our recommendation remains that the Grid Owner is the causer of this UFE.

The System Operator makes the following further submissions on the Authority's draft determination of causer: 11 July 2025 under-frequency event (**Draft Determination**):

1.1 We submit that the Grid Owner, as the owner and operator of the HVDC link, is better placed than the System Operator:

- to know how to operate the HVDC link, including its appropriate control settings, and
- to be fully informed about the operational limits of the HVDC link.

The Grid Owner, not the System Operator, is obliged to operate the HVDC link in accordance with good electricity industry practice (clause 12.113 of the Code).

1.2 The Authority, in its Draft Determination, notes "the grid owner has advised that its grid asset controllers are not required to be experts in electrical engineering and all the systems of the grid." (paragraph 5.16). We submit that the System Operator coordinators are also not required to be experts in electrical engineering and all the systems of the grid, including the HVDC control systems which are particularly complex. The experts in the HVDC link and its control systems are within the Grid Owner's Operational Engineering team, and an HVDC engineer is on call 24/7 to provide advice if needed. The normal process is for advice from the Grid Owner's Operational Engineering team to be given to the Grid Owner control room upon enquiry from a Grid Owner operator. On other occasions, the Grid Owner's HVDC engineers have provided direct advice to Grid Owner operators – including on Sunday 19 June 2025 in response to a query on earlier HVDC bus outages.

1.3 The System Operator would not be expected to be an expert in the operation of other asset owners' assets (generators and connected asset owners). We submit that the Authority should not take a different approach when the relevant asset happens to be part of the grid. The Draft Determination effectively bestows the Grid Owner's HVDC expertise on the System Operator, which is contrary to clause 7.10(2) of the Code.

1.4 In paragraph 5.8 of the Draft Determination, the Authority states that "This decision by the System Operator was made without any involvement by the grid owner". This is incorrect – there was involvement by the Grid Owner through NGOC, which is referenced elsewhere in the Draft Determination and confirmed by a voice recording that we understand the Grid Owner has shared with the Authority. The Grid Owner had an opportunity to disagree with

the System Operator about not selecting HPC Roundpower to Monopole and not selecting HPC Switch Level to 'Increased' at HAY. The Grid Owner operator did not disagree with the System Operator's recommendation as to the appropriate control settings when it was discussed at 6.57 am on 11 July 2025. The System Operator did not unilaterally omit to instruct the Grid Owner to change the control settings – the System Operator discussed this with the Grid Owner first.

1.5 We note that the discussion at 6.57 am on 11 July 2025 did not contain the usual control room command language, either in its content or tone. That discussion was not an instruction by the System Operator to the Grid Owner to leave the control settings unchanged. We submit that the Authority is wrong to say that the System Operator, at the time of the discussion, had already made a decision not to instruct the Grid Owner to change the control settings and the discussion was merely a communication of that decision to the Grid Owner (Draft Determination, paragraph 5.17). At most, this was a System Operator recommendation, which the Grid Owner had the opportunity to respond to and disagree with. The Grid Owner did not disagree with the recommendation, and so the System Operator decided not to instruct the Grid Owner to change the control settings. If the Grid Owner had subsequently challenged this decision, for example after conferring with the Grid Owner's Operational Engineering team, the System Operator could have changed its mind and instructed the Grid Owner to change the control settings.

1.6 We disagree with the Authority that in these circumstances the Grid Owner could not have overridden the System Operator's recommendation (or decision or instruction or however the discussion at 6.57 am on 11 July 2025 is characterised) (Draft Determination paragraph 5.13). The Grid Owner is obliged to act as instructed by the System Operator in a grid emergency (clause 7(21) of Technical Code B) but outside of that the Grid Owner's obligation is merely to cooperate with the System Operator as reasonably required (clause 8.26 of the Code). It would not have been uncooperative or unreasonable of the Grid Owner to challenge the System Operator's view that the changes to the control settings were unnecessary if the Grid Owner had formed a contrary view based on its greater expertise in the operation of the HVDC link. In fact, that is what the System Operator expects the Grid Owner to do.

1.7 We agree with the Authority that the Grid Owner had the opportunity to question or seek further explanation for the deviation from the procedure but did not do so (Draft Determination paragraph 5.16). This was not a grid emergency or a response to real-time conditions in the power system. The discussions between the System Operator and Grid Owner happened one hour before the planned outage was scheduled to begin. There was time for the Grid Owner operator to check the decision with the Grid Owner's Operational Engineering team. Timings of planned outages can and do get deferred if there is a need to review any pre-requisites for the outages.

1.8 We submit that the Draft Determination does not adequately take into account the context at the relevant time. There were non-standard restrictions in place around HVDC filter operations (TI-DP-1195) which is the reason behind the System Operator's view that

changing the control settings was unnecessary. The System Operator's view was not an unreasonable one in the circumstances. Evidently, the Grid Owner's operators agreed, albeit without checking with the Grid Owner's Operational Engineering team.

1.9 We agree that this event has raised questions about the Grid Owner's acceptance of System Operator recommendations without challenge (Draft Determination, paragraph 5.11) and we are dealing with those questions internally.

1.10 Paragraph 5.14 of the Draft Determination states that the Authority considers that the System Operator should have followed its own procedure (as set out in TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages) for removing HAY Bus D, by instructing the grid owner to apply the prescribed control system settings. While that is correct in hindsight, we submit it does not provide a complete answer to the question of who the causer is. The System Operator's discretion to deviate from procedures when operational conditions require or justify it is important given the complexity of the power system and is aligned with the practicalities of System Operator decision making.

1.11 We consider there are strong policy reasons why the System Operator should not be determined as the causer of **any UFE**, at least not by reason of an omission. Among other things:

- If the System Operator can be a causer then this is likely to have a chilling effect on potentially valuable discussions about asset operational matters between the System Operator and asset owners. We believe such discussions are much more likely to avert potential UFEs and other undesirable power system conditions than lead to them.
- If the System Operator can be a causer, particularly by reason of an omission, asset owners may use that to obfuscate what would otherwise be straightforward causer determinations.
- The extension of the causer definition to the System Operator is beyond the original problem description supporting the change to the definition in May 2025. The Authority's October 2024 consultation paper said the change was being proposed to "Include distributors and energy storage systems as potential causers of under-frequency events". There was at that stage no mention of it being a problem that the System Operator could not be a causer, or an intention to capture the System Operator in the amended definition.

1.12 We acknowledge that the current definition of "causer" in the Code is, on its face, sufficiently wide to capture the System Operator. However, for the reasons outlined in the paragraph above, we consider this should not be the case, and submit that there should be a very high bar for determining that the System Operator is the causer of a UFE. In this case, we do not consider the facts support a determination that the System Operator is the causer.

Q2. Do you agree with the System Operator's assessment that 119.84MW was lost from the power system in the 11 July 2025 UFE? If not, please advise your view on the MW lost and give reasons.

Yes – this is consistent with the approach the System Operator has taken to calculate the loss for other UFEs.